

22nd Annual
Student
Research
Forum

April 12 & 19, 2013

Centenary

22nd Annual
**Student
Research
Forum**

April 12 & 19, 2013

Posters

Mickle Hall
(2nd floor)

2:00 P.M.

April 12, 2013

Natural Sciences

Carlile Auditorium
(Mickle Hall first floor)

2:00 – 4:50 P.M.

April 19, 2013

Social Sciences

Kilpatrick Auditorium
(Smith Building)

2:20 – 4:20 P.M.

April 19, 2013

Humanities

Hurley Music Building
(Room 201)

2:40 – 3:20 P.M.

April 19, 2013

22nd Annual Student Research Forum

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AND THE PROVOST AND DEAN OF THE COLLEGE

JUDGES

DR. DAVID BIELER.....	<i>Associate Professor of Geology</i>
DR. DAVID BROWNHOLLAND	<i>Assistant Professor of Chemistry</i>
DR. GREG BUTCHER.....	<i>Associate Professor of Neuroscience</i>
DR. CHRIS CIOCCHETTI	<i>Associate Professor of Philosophy</i>
DR. MICHELLE GLAROS.....	<i>Associate Professor of Art</i>
DR. MARK GOADRICH.....	<i>Broyles Chair of Computational Mathematics</i>
DR. TROY MESSINA	<i>Wortham Chair of Engineering</i>
DR. REBECCA MURPHY.....	<i>Assistant Professor of Biology</i>
DR. DAVID OTTO	<i>Crawford Chair of Liberal Arts</i>
DR. MATT WEEKS.....	<i>James Chair of Psychology</i>
DR. KELLY WEEKS	<i>Associate Professor of Business</i>
DR. MICHELLE WOLKOMIR	<i>Professor of Sociology</i>
DR. MICHAEL SALVATORE	<i>Professor of Pharmacology, Toxicology & Neuroscience</i>
DR. NANCY LEIDENHEIMER.....	<i>Professor of Biochemistry & Molecular Biology</i>
DR. JOHNETTE MAGNER.....	<i>Executive Director at Shreveport-Bossier Business Alliance for Higher Education</i>
SARAH SMITH	<i>Attorney at Ayres, Warren, Shelton & Williams</i>
DR. JEFFERY EVANS.....	<i>ULM Associate Professor</i>
LINDSAY ATKINS.....	<i>Philanthropist and Volunteer</i>

DIRECTOR

DR. SCOTT CHIRHART
22nd Annual Student Research Forum

POSTER Presentations/Judging

* Presentation and judging will take place on Friday, April 12th between 2:00 p.m.-6:00 p.m. on the second floor of Mickle Hall. In preparation of the judging, presenters should have their posters in place and ready at their assigned locations no later than Thursday evening.

2:00 P.M.	Provost Mike Hemphill	Introduction/Welcome
2:15 P.M.	Adam Littleton.....	Psychology
2:30 P.M.	Taylor Atkinson	Psychology
2:45 P.M.	Trevor Stine	Geology
3:00 P.M.	Jackson Blankstein.....	Mathematics
3:15 P.M.	Alexandra Larsen, Ryan O'Donnell & Gerhardt Funk	Mathematics
3:30 P.M.	Charles Madden, Madeline Fechter, Thien Ly Nguyen, & Paul Eugene	Chemistry
3:45 P.M.	Adrian Capello.....	Biology
4:00 P.M.	Fortunato Padua, Justine Kemp, Kunaal Patel, & Erica Glidewell.....	Biology
4:15 P.M.	Taylor Atkinson, Victoria Luraguiz, & Payton Weidner	Biology
4:30 P.M.	Monique Long, James Hall, Brandon McRae, & Ghalia Thaljah	Biology
4:45 P.M.	M. Payton Weidner.....	Biology
5:00 P.M.	Alexandra L. Ross.....	Biology
5:15 P.M.	Brandon McRae	Biology
5:30 P.M.	Samuel Hall and Andrea Lemus.....	Biology

ORAL Presentations/Judging

* Presentation and judging will take place on Friday, April 19th. Locations and starting time vary by division.

Natural Sciences

in Carlile Auditorium

2:00 P.M.	Provost Mike Hemphill	Introduction/Welcome
2:10 P.M.	Matthew Pittman	Geology
2:20 P.M.	Alex Larsen.....	Mathematics
2:30 P.M.	Jackson Blankstein.....	Biophysics
2:40 P.M.	Michael Reeks	Biophysics
2:50 P.M.	Gerhardt Funk.....	Biophysics
3:00 P.M.	Paige Pritchett.....	Biophysics
3:10 P.M.	Everett D Grimley.....	Physics
3:20 P.M.	Adrian Capello, Faith Clingen, James Hall, Lauren Marlar, & Ericka A. Vasquez....	Learning Community
3:30 P.M. — 3:40 P.M.	Break	

SCHEDULE

3:40 P.M.	Ericka A. Vazquez.....	Chemistry
3:50 P.M.	S. Garrett Whipple.....	Chemistry
4:00 P.M.	Luke Lisherness.....	Biology
4:10 P.M.	Lindsey Fileccia.....	Biology
4:20 P.M.	Charles Madden	Chemistry
4:30 P.M.	Jessica Liebllich	Biochemistry
4:40 P.M.	Victoria Luraguiz	Biology

* Natural Sciences Oral Presentations end about 4:50 P.M.*

Social Sciences

in Kilpatrick Auditorium

2:20 P.M.	Provost Mike Hemphill	Introduction/Welcome
2:30 P.M.	Jessica Garris	Psychology
2:40 P.M.	Kyle Rhoads Kraemer.....	Psychology
2:50 P.M.	Zoe McSwain	Psychology
3:00 P.M.	Karley Aiken	Sociology
3:10 P.M.	Jeridan Green	Sociology

3:20 P.M. — 3:30 P.M. Break

3:30 P.M.	Greg Jackson.....	Business
3:40 P.M.	Nicholas Long	Business
3:50 P.M.	Joshua Scott.....	Economics
4:00 P.M.	Todd LaFarlette.....	Economics
4:10 P.M.	Adam Ghaemmaghani	Economics

* Social Sciences Oral Presentations end about 4:20 P.M.*

Humanities

in Hurley Music Building, Room 201

2:40 P.M.	Provost Mike Hemphill	Introduction/Welcome
2:50 P.M.	Holden Penney	Religious Studies
3:00 P.M.	Brenton Gryder.....	History and Political Science
3:10 P.M.	Kendall Hughes.....	Religious Studies

Humanities Oral Presentations end about 3:20 P.M.

POSTERS

Physiological and Subjective Measures of Discrete Mental States

Adam Littleton

Research Advisor: Dr. Matthew Weeks

Department of Psychology
Centenary College of Louisiana

This experiment expands upon previous research investigating physiological measures of mental states (Mauri, Cipresso, Balgera, Villamira & Riva, 2011). The goal of this study was to verify the efficacy of various physiological and subjective measures of distinct mental states. This will be helpful for future research of human mental states by providing support for the validity and reliability of these measurement tools. This was accomplished by comparing physiological measures used in previous studies with subjective measures of those mental states. Mental states of participants were measured using both physiological (electromyography of the corrugator supercilii and galvanic skin response) and subjective (perceived emotions) measures during a series of four tasks, each designed to elicit one of four emotional responses: sadness, relaxation, happiness, and stress.

Strength of Handedness and Backward Recall

Taylor Atkinson

Research Advisor: Dr. Matthew Weeks

Department of Psychology
Centenary College of Louisiana

Many cognitive functions require the use of specialized areas of the brain that are generally localized to one side of the brain or the other. Some functions use multiple areas and rely on the corpus callosum to communicate information between hemispheres. Backward recall is one such task that requires different hemispheres for different functions. Encoding has been shown to be a left-hemisphere activity while recall involves processes in the right hemisphere. Research has shown that in such cases the size of the corpus callosum can have an influence on an individual's ability to carry out such a task. Without access to expensive brain imaging techniques, corpus callosal size can be inferred by strength of handedness because the two have been shown to be correlated. In order to test to see if corpus callosal size has any bearing on ability to perform on a backward recall task, participants were given a survey to determine strength of handedness and several recall tasks. Visual-spatial cognitive ability was measured and controlled for.

Dust Bowl Hydrology: Rainfall patterns in the Arkansas River Basin

Trevor Stine

Research Advisor: Dr. David Bieler

Department of Geology
Centenary College of Louisiana

A big question asked last year was whether or not we were entering another Dust Bowl similar to that of the 1930's. In this study, GIS is used to portray and analyze spatial and temporal patterns of annual rainfall for the Dust Bowl time period in the Upper and Middle Arkansas River Basins.

Precipitation data for 1921 to 1950 were obtained for 27 USHCN stations in and around the Arkansas River basin. Total annual precipitation and annual deviation from the 30-year average were plotted and contoured in ArcGIS. Proposed boundaries of the Dust Bowl were obtained from the USDA. Annual deviations show an extended seven to ten year period of rain fall deficiencies in eastern Colorado and western Kansas. Periods of deficiency precede those years for the headwater regions of the Arkansas. Contour maps show that the deficiencies maximize in the core of the Dust Bowl with persistent deficiencies from 4 to 6 in/yr throughout this region.

This work strives to develop a framework to which recent precipitation patterns can be compared. In addition to these analyses, patterns in stream discharge should also be studied to better understand the surface water hydrology of the Dust Bowl time.

Procedural Generation Of 2-D Caves Using Biased Cellular Automata

Jackson Blankstein

Research Advisor: Dr. Mark Goadrich

Department of Mathematics
Centenary College of Louisiana

"Roguelike" games use procedurally generated algorithms to create random level designs such that the player experiences something different with each playthrough. A popular method for generating cave-like structures and carving out spaces for rooms is cellular automata (CA). However, these spaces tend to be rooms with huge open spaces, and often not completely connected. In our research, we altered the process for CA cave creation by randomly placing random numbers of centroids of variable size, thus biasing the CA process into creating specific rooms that are a certain distance apart. We also connected the rooms with a minimum spanning tree using Prim's algorithm. Finally, we used a recursive algorithm to make a maze-like grid of these cave spaces. We found that these biased CA caves combined the structure of mazes with the randomness of caves to create satisfying levels for play.

Modeling the Cost of Water Desalination in Egypt

Alexandra Larsen, Ryan O'Donnell, and Gerhardt Funk

Research Advisor: Dr. Mark Goadrich

Department of Mathematics
Centenary College of Louisiana

The purpose of this project was to develop a plan for water usage in Egypt. Historically, the majority of Egyptians rely on the Nile River for water. In fact, today roughly ninety-nine percent of Egyptians use on the Nile River for industries, households and agriculture. Other less-used water sources in Egypt include saltwater from the Mediterranean Sea and the Red Sea. Saltwater can be made potable by the process of desalination. While saltwater is highly abundant, the cost to carry out desalination is very high. We found previous research that shows that while initial costs of desalination may be high, over time the cost decreases. The model we built aims to predict the optimal amount of money that should be spent on desalination over the next 25 years, given a budget for water expenditures. According to our model, the true expense regarding water supply for Egypt is transportation costs, rather than costs of desalination. Rather than examining decreasing desalination costs, a more helpful optimization problem would aim to develop strategies to decrease transportation costs.

Synthesis of Straight-Chain Bolalipids with Varying Alkyl Chain Lengths

Charles Madden, Madeline Fechter, Thien Ly Nguyen,
and Paul Eugene

Research Advisor: Dr. David Brownholland

Department of Chemistry
Centenary College of Louisiana

Tetraether lipids, or bolalipids, occur naturally in archaeal-membranes and offer budding advancements in membrane-based biotechnology, such as biosensors and drug delivery vehicles. The enhanced stability of these lipids is brought in large part because of ether linkages between the glycerol backbone and lipid chain and the presence of transmembrane alkyl chain(s). In attempts to generate a more fundamental understanding of the structure/function relationships between bolalipids and their resulting membranes, bolalipids of varying alkyl chain lengths are synthesized. We report progress on the synthesis of three lipids, C₁₆BAS, C₂₄BAS, and C₂₈BAS. Further, we describe the synthesis of bisfunctionalized C12 and C14 alkanes, essential precursors for the synthesis of these tetraether lipids. With the help of the previously synthesized bolalipids, C₂₀BAS and C₃₂BAS, we will use these bolalipids to probe the effects of chain length on the biophysical properties of their membranes.

The Effects of Prenatal and Adult Oxycodone Exposure on the Expression of Addiction Biosignatures

Adrian Capello

Research Advisors: Dr. Krystle Nichols and Dr. Lisa M. Schrott

Department of Pharmacology, Toxicology & Neuroscience
Louisiana State University Health Sciences Center
Shreveport, LA

Oxycodone is an analgesic used to treat pain and has increased significantly in legitimate use. The development of markers of oxycodone efficacy as an analgesic and its abuse potential is important because little is known about the consequences of chronic use. In order to determine the effects of prenatal and adult oxycodone exposure on the expression of markers in the cortex and the cerebellum, pregnant Sprague-Dawley rats and the second generation adult rats were treated for 30-days via oral gavage with ascending doses of oxycodone HCL up to a 15 mg/kg/day dose, which was maintained during breeding and gestation. Controls were treated with water. The subjects were assessed for the receptor that binds to oxycodone, the mu opioid receptor, and the GluR1/R2 subunit of the glutamate receptor, which is involved in plasticity. Cortex and cerebellum samples were homogenized and fractionated into cytosolic and synaptic density fractions. Western blotting was used to analyze the samples and the optical densities indicated exposure decreased the expression of the mu opioid receptor in the cortex and the expression of the GluR1 subunit of the glutamate receptor in the cerebellum. These data suggest that prenatal oxycodone exposure effects opiate addiction by reducing the expression of receptors that are involved in the initial and downstream responses.

The Effects of Caffeine Metabolism on Memory and Physiological Response

Fortunato Padua, Justine Kemp, Kunaal Patel, and Erica Glidewell

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

The primary purpose of this project is to test the effects of caffeine consumption on memory and physiological measures. This project is of interest because caffeine is the most commonly consumed drug in the world and we are interested in its effects on heart rate, blood pressure and overall memory. To insure the validity of this data, the study was performed in a double-blind manner. In this study, we also analyze different potential confounding factors that could affect caffeine metabolism or memory results, such as birth control, Attention Deficit Disorder (ADD)/Attention Deficit Hyperactivity Disorder (ADHD) diagnosis, and previous consumption of caffeine. Data was analyzed via one-tailed t-tests when looking solely at pre-caffeine consumption/post-caffeine consumption memory tests and pre-consumption/post-consumption physiological response values. ANOVAs will be used for analysis of multi-factorial data. We hypothesize that caffeine consumption increases heart rate, blood pressure and memory by the parameters we have set.

Effects of Gut Bacteria on Food Preference of *Drosophila melanogaster*

Taylor Atkinson, Victoria Luraguiz, and Payton Weidner

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

Feeding behavior is thought to be influenced by an organism's nutritional needs and gut microbiota. However, the mechanisms involved in food selection remain poorly understood in many invertebrates such as in *Drosophila melanogaster*. This study explores the effects of disturbances in the gut flora, through the use of antimicrobials, on food preference. Two groups of *Drosophila melanogaster* flies were reared on their respective medium, either starch or molasses. Flies were starved and then given the choice between the two media. Ten flies from each group were analyzed through quantitative PCR to determine rewarding. The remaining flies were administered antimicrobials in a cornmeal solution to eliminate their gut microbiota. Bacterial cultures from group were extracted and a cross-inoculation was performed. Flies were again given the choice between the two media and 10 flies from each group were analyzed for dopamine levels using quantitative PCR.

Associative Memory in *Chilopoda lithobiomorpha*

Monique Long, James Hall, Brandon McRae, and Ghalia Thaljah

Research Advisor: Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

For our project, we wanted to find out if the arthropod *Lithobiomorpha* (centipedes) can form associative memories. We chose this model organism because it is a predator and would likely need to have evolved a memory system for hunting. We tested this by running the centipedes through a Y-maze with a reward in one arm. After training the subjects with the reward on one side, the reward was either removed or the side switched, and we monitored the behavior of the subjects. The centipede was given three minutes to choose an arm of the maze to run down. The direction that the centipede chose and the time spent in the maze was recorded. We found that the centipedes do develop associative memory; therefore they could be used as a basic model for forming memories. They are an ideal model due to their less complex neuroanatomy compared to higher vertebrates from which future experimenters could hypothesize the formation pathway of associative memories.

Characterization of the *A. haemolyticum* arcanolysin (*aln*) gene in smooth and rough biotypes

M. Payton Weidner

Research Advisors: Dr. David J McGee and Haley S. Ruther

Department of Microbiology
Louisiana State University Health Sciences Center
Shreveport, LA

Arcanobacterium haemolyticum is a gram-positive bacterial species that causes pharyngitis or wound infections in humans. *A. haemolyticum* strains are divided into two different colony phenotypes: rough and smooth. The smooth phenotype is associated with wound infections, while the rough phenotype is associated with pharyngitis. As of now, there is no way to genetically distinguish between rough and smooth biotypes. Recently, our laboratory has identified and characterized arcanolysin (ALN), a member of the cholesterol-dependent cytolysin family. PCR amplification and sequence analysis of *aln* from smooth and rough *A. haemolyticum* isolates from Finland showed that some strains possess a 1.2 kb insert. Strikingly none of the smooth isolates contained the insert, while more than half of the rough isolates had the insert. We acquired more isolates of *A. haemolyticum* from Nebraska and interestingly none of these possessed the 1.2 kb insert, despite some isolates having a rough phenotype. To ascertain whether there is additional genetic diversity in *aln*, the upstream region of the gene was PCR amplified and sequenced. Sequence analysis of this upstream region from *A. haemolyticum* isolates from Finland revealed that nearly all the rough isolates were phylogenetically clustered together, and were distinct from the upstream region of smooth isolates. We hope to further utilize PCR and DNA sequencing to investigate if the trend holds for the Nebraska isolates. The data suggest *aln* may be used to genetically distinguish smooth and rough *A. haemolyticum* isolates.

The effects of increasing doses and incubation times of lipopolysaccharide on interleukin-6 production by murine macrophages

Alexandra L. Ross

Research Advisor: Dr. Cristina Caldari-Farren

Department of Biology
Centenary College of Louisiana

Lipopolysaccharide (LPS) is a component of the outer membrane of Gram-negative bacteria that can be recognized by macrophages. Macrophages are cells of the innate immune system that upon activation through their interaction with pathogens produce cytokines that help activate other immune cells. One of the important cytokines produced by macrophages is the pro-inflammatory cytokine interleukin-6 (IL-6). The objective of this study was to determine the effects of LPS treatment on cultured murine macrophages (RAW 264.7 cell line). Treatment of murine macrophages for 24 h with increasing doses of LPS (0, 0.01, 0.10, 1.0, 10.0, 100 µg/ml) resulted in an increase in IL-6 levels measured in the supernatant (P -value<0.001). Treatment of murine macrophages with 0.01 µg/ml of LPS for increasing incubation times (0, 0.5, 1, 3, 6, 12 h) resulted in an increase in IL-6 production by these cells (P -value<0.001). In a second time-response experiment with incubation times between 0.5 and 3 h we also measured an increase in IL-6 production by RAW 264.7 cells (P -value<0.001). These results suggest we have achieved a working

murine macrophage-culture system and are valuable in helping us select an optimal LPS incubation time and dose for further experiments involving this cell line.

Can GAD65/67 expression be used to identify nearly-mature olfactory sensory neurons?

Brandon McRae

Research Advisors: Devin Owens and Dr. Kathryn A. Hamilton

Department of Cellular Biology and Anatomy
Louisiana State University Health Sciences Center
Shreveport, LA

Olfactory sensory neurons (OSNs) are unique neurons found in the main olfactory epithelium (MOE) of the vertebrate nasal cavity. OSNs have a constant turnover throughout life, even in adults. Previous studies have examined the function of inhibitory GABAergic interneurons in the main olfactory bulb (MOB) using transgenic mice that express enhanced GFP using the promoter for glutamic acid decarboxylase 65 (GAD65). In previous experiments, a subset of cells in the MOE have been shown to express GFP. The GFP(+) cells exhibited typical features of OSNs; the soma gave rise to a dendrite that extended toward the nasal cavity and to an axon that extended toward the MOB. The dendrite did not make contact with the nasal cavity or express components of the olfactory transduction signaling cascade ($G\alpha_{olf}$ or ACIII), however, indicating that the GFP+ OSNs were immature. We hypothesize that immature OSNs might transiently express GAD65 when they are almost mature. We are testing this hypothesis by immunostaining MOE sections of GAD65-GFP mice, normal littermates, and C57BL6/J (background) mice for GAD65/67. The results will reveal if GAD65/67 expression can be used to identify nearly-mature OSNs in the MOE, providing a new biomarker for future studies of these neurons

Bean Beetle Circadian Rhythm

Samuel Hall and Andrea Lemus

Research Advisors: Dr. Greg Butcher and Dr. Scott Chirhart

Department of Biology
Centenary College of Louisiana

The purpose of this project was to determine whether or not the bean beetle, *Collosobruchus maculatus*, possesses the genes for circadian rhythm proteins. This was performed by running a BLAST (basic local alignment search tool), PCR, and gel electrophoresis. The results of the project were inconclusive because the primers were not compatible with bean beetle DNA because the primers dimerized during the PCR process. The next step in this project would entail the development of primers that would target the specific mRNA that codes for the proteins of interest.

NATURAL SCIENCE ORAL PRESENTATIONS

Ion Exchange Chromatography Techniques for Determination of REE in Ultramafic Rocks

Matthew Pittman

Research Advisor: Dr. Scott Vetter

Department of Geology
Centenary College of Louisiana

The abundance and elemental ratios of the rare earth elements (REE) are used as indicators of the petrogenesis of rocks. Typical basaltic rocks have REEs in ppm abundances. Ultramafic igneous rocks have extremely low concentrations of the REE at or near the detection limit of the ICP-MS. Ion-exchange columns have been used to remove unwanted elements thereby concentrating REEs so they can be detected by the ICP-MS without additional dilution. Exchange columns consisted of a 30 mL beaker with a conical bottom that was welded to 30 cm long, quarter-inch diameter Teflon tubing. Twenty-one cm of 50Wx8 cation exchange resin (200-400 mesh) was placed in the columns for all extractions. Samples were dissolved in HNO₃ and HF, dried; redissolved in HCl, and loaded into the column. The first 70 mL of eluent gave >99% of the REEs were captured off the column.

Using Machine Learning to Predict a Bad Day - Text Classification for FMyLife.com

Alex Larsen

Research Advisor: Dr. Mark Goadrich

Department of Mathematics
Centenary College of Louisiana

FMyLife.com serves as a forum for individuals to post the consequences of embarrassing, awkward or sad personal stories. Visitors on the site vote either "I agree, your life sucks" (a 'top' vote) or "You deserved it" (a 'flop' vote). This project seeks to provide insight into what makes a top/flop classification from FMyLife.com using computational and statistical techniques. A variety of machine learning techniques were used to build a model capable of predicting a top or flop vote based solely on the text of the posts. The data for this project consisted of words collected in 2009 from roughly 900 posts on FMyLife.com. We compiled different datasets using various pre-processing techniques such as word stemming and stop lists. We employed support vector machines, neural networks, logistic regression, clustering and decision trees, and evaluated our results using the area under the ROC curve. We found that these techniques were successful at outperforming a randomized baseline model.

Creating Interactive Physics Demonstrations in the Unity3D Game Engine

Jackson Blankstein

Research Advisor: Dr. Troy Messina

Department of Biophysics
Centenary College of Louisiana

This research intends to create interactive physics demonstrations to be used in conjunction with physics teaching. These will be interactive demonstrations created using the software Unity3D, a highly popular, free game engine. Some three dimensional graphics and animations will also be used, created with both Unity3D and Autodesk's Maya software. All code was written in C#, a language supported by Unity. The physics concepts used in demonstrations focus on basic physics taught in first and second-year courses, but with some demonstrations for upper level physics classes as well. Some of the demonstrations will utilize Unity3D's built-in physics engine, PhysX, but for some concepts physical systems will have to be created. These demonstrations will be able to play on any computer running the free version of Unity3D, making it easily accessible for students both in the lab and at home.

Accelerometer-Based Gait Analysis

Michael Reeks

Research Advisor: Dr. Troy Messina

Department of Biophysics
Centenary College of Louisiana

The purpose of this research was to try to develop an inexpensive, portable way to identify gait abnormalities in humans. A portable 3-dimensional accelerometer was built to track movement in all directions. The accelerometer obtained various accelerations which were used to model the motion that was being performed, and was attached to different appendages to track their motion. When applied to the gait of someone's walk, it tracked the motion of their stride and gave us valuable information that could be used to model and detect gait abnormalities. We will demonstrate simple motions, and compare them to human gait motions to demonstrate the feasibility of our device.

Apparatus and Theory for Lightning Detection

Gerhardt Funk

Research Advisor: Dr. Juan Rodriguez

Department of Biophysics
Centenary College of Louisiana

The purpose of this research is to design an apparatus capable of analyzing the current in a lightning strike. A pulse generator was used to simulate a probable form of current through the first return stroke of a negative downward lightning strike. This pulse was passed through a resistor to generate a magnetic field similar to that produced by lightning to test the apparatus. The apparatus itself consists of a solenoid and oscilloscope. "Ringing" nature in the solenoid due to its dual nature as a capacitor is considered. Applications for the apparatus are then discussed.

Molecular Modeling of Casein Kinase 1 to Determine Relevance of Conserved Potential Phosphorylation Sites

Paige Pritchett

Research Advisor: Dr. Troy Messina

Department of Biophysics
Centenary College of Louisiana

Protein kinases are a family of enzymes found to be rather homologous across many species. They are responsible for transferring phosphate from ATP to a protein substrate. Within the family are eight subfamilies. Casein Kinase 1 (CK1) is one subfamily of protein kinases relevant to regulating cell proliferation and differentiation, chromosomal segregation, and circadian rhythm. In humans, malfunctioning CK1 has been linked to neurodegenerative diseases and cancer. CK1 activity has been shown to be reverse regulated, becoming inactive upon phosphorylation. In this study, we have used pBlast to determine highly conserved regions of CK1. Within these regions are phosphorylation sites putatively important activation/deactivation of the kinase. Mutations to CK1 were made and studied in vitro, in vivo, and in silico. We will present results of molecular dynamics computer simulations using NAMD. We have identified structural changes large enough to modify kinase activity. The simulation results will be contextualized in terms of the laboratory work

Using point-contact Andreev reflection spectroscopy for measurement of the surface spin-polarization of perovskite oxides

Everett D Grimley

Research Advisor: Dr. Amlan Biswas

Department of Physics
University of Florida
Gainesville, FL

The utility of electron spin and spin-polarized currents in electronic devices is gradually becoming more realized as spintronics, or spin-based electronics, are increasingly researched in the scientific community. Such devices are capable of functioning with an extra dimension of control, as the very currents driving them are often spin-polarized. Furthering of this field will require the determination of the spin-polarization of various materials so they can be properly applied to spintronic devices. Point-contact Andreev reflection spectroscopy (PCAR) affords a direct means of measuring the spin-polarization at the surface of a material by monitoring the change in conductance with voltage of a current traveling between a superconductor/material interface. Sharp niobium tips were electrochemically etched using potassium hydroxide solution. Surface spin-polarization measurements for normal metals and perovskite oxides including $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ were measured by PCAR with niobium tips at temperatures near 4.2K. Surface spin-polarization values were generally found to be lower than predicted.

Investigation of Alternative Cooking Fuel Sources For Use in Haiti

Adrian Capello, Faith Clingen, James Hall, Lauren Marlar,
and Ericka A. Vazquez

Research Advisor: Dr. Joshua Lawrence

Department of Chemistry
Centenary College of Louisiana

In Haiti, the main source of cooking fuel is Haitian-made charcoal. This results in extreme deforestation; therefore, we sought an alternative fuel source that could be used by Haitians. To investigate the fuel potential of algae and duckweed, algae and duckweed were grown in nitrogen rich water and pond water for 18 days. The heat released from the combustion of algae and duckweed was measured by bomb calorimetry. The experiment values were compared Kingsford Charcoal briquettes. Charcoal was also produced using Haitian methods. The heat released from the combustion of charcoal was measured using bomb calorimetry. The calculated growth rate and heat released from combustion suggests that algae and duckweed are potential alternative fuel sources for Haitians.

Synthesis of Asymmetric Bolalipids through a Cross-Metathesis Reaction

Ericka A. Vazquez

Research Advisor: Dr. David Brownholland

Department of Chemistry
Centenary College of Louisiana

Asymmetric bolalipids proposed in the lab were modeled after Archaeal-type phospholipids. The capability of membranes composed of Archaeal-lipid mimics to remain stable in harsh conditions of extreme temperature, salinity, acidity, and aerobic or non-aerobic condition is a curious and worthwhile topic of investigation for the future of biotechnology. Before membrane-based biotechnology can expand, further research on the effects of varying structures and the resulting physical properties must be better understood. Synthesis of asymmetric, trans-membrane lipids with varying chain lengths and synthetic groups will aid in this investigation. The cross-metathesis reaction plays a key role in accomplishing this varied composition.

The Synthesis of Asymmetric Tetraether Lipids Through a Convergent Wittig Reaction

S. Garrett Whipple and Alexandra Hebert

Research Advisor: Dr. David Brownholland

Department of Chemistry
Centenary College of Louisiana

Archaea membrane lipids have sparked interest in their application to various biotechnologies due primarily to their enhanced stability compared to lipids found in bacteria and eukaryotes. Extracting these lipids from Archaea results in poorly yielding bulk lipids that are difficult to separate efficiently. Also, the synthesis of

these tetraether lipids is just as inefficient due to their chemical complexity. This has led to the synthesis of Archaea lipid mimics; lipids containing some of the motifs as the naturally occurring lipids, but significantly less complex, while maintaining the observed favorable biophysical properties. I report progress towards the synthesis of asymmetric lipid via a convergent Wittig reaction as the key transformation. The biophysical properties of membranes formed from these asymmetric lipids will be evaluated after they are generated.

Interference of GDNF Signaling *In Vivo* with Antibodies: A Non-Genetic Approach for Neuroanatomical Specific Interference in Trophic Factor Signaling

Luke Lisherness

Research Advisor: Dr. Michael F. Salvatore

Department of Pharmacology, Toxicology & Neuroscience
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Impaired locomotor activity (bradykinesia) is a hallmark of Parkinson's disease and aging. For nearly two decades there has been a wealth of evidence suggesting that glial cell line-derived neurotrophic factor (GDNF) signaling can not only affect locomotor activity, but also dopamine neuron homeostasis. Here we propose to use an antibody to GDNF itself to determine its impact on dopamine regulation in the substantia nigra (SN). We infused 36 ng of GDNF antibody (D-20: sc-328) into the left SN of three month old Brown-Norway Fischer 344 F1 hybrid rats. Tissue samples were collected from the SN, striatum, ventral tegmental area (VTA), and nucleus accumbens (NAc). Tissue sample was processed via HPLC to determine dopamine content and western blot to determine TH protein and TH phosphorylation. Here we show that infusion of anti-GDNF produced a decrease in dopamine tissue content and TH protein that was selective for the SN, as no apparent effect was seen in the striatum. These data suggest that this approach may be useful for not only further delineating the impact of GDNF on dopamine biosynthesis, but also if GDNF signaling has a greater impact on locomotor activity in the SN versus the striatum.

Functional Annotation of Ebola and Marburg virus proteins via Community Assessment of Community Annotation with Ontologies

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Genomic technology is advancing at an increasing rate and large amount of data is being generated. As a result, Professional biocurators are necessary to sort through newly published data and catalog this information in databases that make it accessible for the scientific community. Biocurating is time consuming and professional biocurators are limited. However, Texas A&M University has found a way to be tackling this daunting task while also training new biocurators by creating a competition called the Community Assessment of Community Annotation with Ontologies (CACAO). CACAO is a nationwide competition for undergraduates that teach students to annotate protein function using accepted gene ontology. We chose to begin annotating on the Ebola virus, one of the two most common members of the class

Filoviridae. Ebola causes a hemorrhagic fever that currently has no cure. Its genome consists of is made up for seven known proteins, including VP24, VP30, VP35, and NCAP, of which we made functional annotations. Our annotations of Ebola led us to a closely related virus also in Filoviridae, the Marburg virus. Following annotation of many proteins from both viruses, we used the Basic Local Alignment Search Tool (BLAST) to investigate the amino acid sequences of those proteins and compare them with other closely related sequences with known functions for comparison. For both of these viruses, natural variants have been isolated that contain mutations in these proteins that result in reduced virulence. Ultimately, these comparisons can be used to help infer functional domains and other protein features that could be used downstream for the potential development of medical treatments, including vaccines, drug design targets, or other technologies.

Synthesis of C24BAS and Liposomal Studies

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Tetraether lipids demonstrate promise in enhancing the membrane stability of the growing numbers of membrane-based biotechnologies (e.g., biosensors and drug delivery vehicles). Unfortunately, little is understood regarding the structure/function relationship between tetraether lipids and their resulting membranes. We report the synthesis of C₂₄BAS, a bisphosphocholine tetraether lipid with a single 24-carbon membrane spanning chain. This lipid, together with biophysical data on previously synthesized C₂₀BAS and C₃₂BAS, will allow for a detailed biophysical analysis of the impact of membrane thickness on the biophysical properties of membranes composed of tetraether lipids. We also report progress on the analysis of the immunological response of membranes composed of C₂₄BAS in the C57/BL/6 mice model in order to partially assess the viability of these lipids in drug delivery vehicles.

The Anticancer role of Curcumin

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Curcumin is a polyphenol natural product has been discovered to have a variety of biological properties. In recent years, this curcumin has stimulated interest in treatment of cardiovascular diseases, neurodegenerative diseases, diabetes, and cancer. As research continues, evidence has shown that curcumin's anticipated cellular targets continue to increase. Curcumin also shows great molecular adaptability. The mammalian target of rapamycin (mTOR) is a kinase that regulates cell growth, survival, and motility. Many times the dysregulation of mTOR signaling occurs in cancer cells. Therefore, targeting mTOR signaling is a new method for prevention of cancer. Recent studies have suggested that mTOR is a new target of curcumin. This current knowledge concerning the effects of curcumin on mTOR signaling will be reviewed for better understanding of the anticancer role of this phenol molecule. The emerging studies of mTOR signaling on curcumin with cancer patients will also be discussed.

The Neurobiology of Trust: Oxytocin

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Trust is an essential element in all societies throughout the world. It is not only indispensable among daily human interactions but also plays a key role in economic exchange and politics. Betrayal of trust is also ubiquitous in societies but human beings seem to be able to overcome these social risks through interpersonal interactions. Little is known about the neurological and biological basis of trust among humans. However, recent behavioral evidence has shown that the neuropeptide oxytocin increases both trust and generosity among humans when emotional identification with another person occurs. Oxytocin seems to not only be involved in social attachment and human affiliation but is also an essential mediator in emotional and social behaviors, since it has shown to decrease anxiety, stress, and aggression when in the presence of other humans. Identifying the underlying neural and behavioral mechanisms of the neuropeptide oxytocin should provide deeper understanding of the biology of trust and distrust among humans in societies.

SOCIAL SCIENCE ORAL PRESENTATIONS

Juvenile Justice and Recidivism: Patterns Among Judges

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At Caddo Parish Juvenile Justice Center, detention center standards are changing. The three judges have to ensure the number of children in detention does not exceed 24. In the past, the children were often allowed to be double-bunked and the center was left in excess of 50 children. They have to carefully decide which kids are dangerous enough to keep in detention, and release those who are less likely to be a danger to themselves or the public. Judge X consistently has less kids in detention than Judges Y and Z. This presentation will describe reasons why this pattern is present, look at recidivism rates for those children released, and decide whether Judge x is right in their decision to keep less children in detention. Furthermore, some employees of the Caddo Parish Juvenile Justice Center are trying to decide whether it would be better to allow each Judge to have 8 beds each or if they should be allowed to share and exchange all 24 beds accordingly. I will use information gathered through data and interviews to allow the detention center to answer this question.

Incidental Learning During a Competitive Social Task

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In many cases, learning of implicit relationships and concepts has been demonstrated when participants are asked to perform tasks. However, there has been little research on implicit learning during fun and/or social tasks. Forty participants agreed to play 30 minutes of a simplified version of five-card-draw poker. Participants in the experimental group played the game using playing cards which, instead of figures or symbols in the middle, contained a clearly printed phobia and its definition. Participants in the control group played the game with normal playing cards. Afterwards, each group was given a 52-item assessment, which asked participants to match the names of phobias to their definitions. Short surveys were given before and after the poker session to provide background on the participants and insight into their activity during the game. Results were analyzed and considered for the potential implications they have on the application of implicit learning.

The Effect of Christian Belief on Women's Perceptions of Sex

Zoe McSwain

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While seemingly taboo, sex is also one of the most intriguing topics among college students. There are notable differences in the reasons that college men and women have sex and Christian belief can play a large role in these differences. This study seeks to find out the ways in which college women perceive and prioritize sex in their own individual lives and how this might be associated with Christian belief. An extensive interview was conducted for this study, in which both liberal Christian and secular college women were asked about their religious beliefs and their thoughts on gender stereotypes, society's expectations of sexual behavior, and their emotions about the role sex plays in their own lives. These interviews were coded to find similarities and differences between the importance of sex in the lives of liberal Christian and secular college women.

Reconfiguring the Fairytale: Exploring Gender Relations in Polyamory

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The idealized relationship model and traditional gender norms that dictate the romantic love fairytale and ideology are governed by the heterosexual imaginary and heteronormative relationship template. This template proposes

monogamy as the only relationship model, presenting ideal romantic love to be unique and exclusive, as well as consisting of heterosexual partners with the woman as the inferior partner. But what happens to gender enactment when this template changes? This study explores polyamory, a model of responsible nonmonogamy which emphasizes open, honest communication, intimacy, transparency, and equal access to partners, to examine how gender is enacted between polyamorous partners. Drawing on data collected through face-to-face interviews and workshops at a poly community convention, this study reveals that polyamorous relationships allow for and encourage more egalitarian gender relations and ideals than that of the traditional monogamous model.

Facing Familial Disruption: Biological Children and their Adopted Siblings

Jeridan Green

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Many familial disruptions can occur throughout a child's life: divorce, remarriage, or adoption. However, the adoption of a new sibling is distinctly different from marital changes. It does not affect family income, but rather the time and attention of parents. While social scientists have analyzed how adoptive siblings fare in new families, very little research has examined how biological children adjust to their adoptive siblings. To bridge this gap in the literature, I conducted face to face interviews with six subjects focusing on the subject's adjustment before, during, and after the adoption. Data was coded using analytic induction. Findings revealed two patterns of response to adoptive siblings. While all participants noted a loss of time and attention after the adoption, Group 1 become jealous of their new siblings and distanced themselves from the family. They suffered negative behavioral and affective consequences. In contrast, participants in Group 2 felt included in the adoption, took on new responsibilities, and perceived increased family unity through the adoption. They had no discernible negative life changes. This research shows that the familial disruption need not have negative outcomes for children if families negotiate such changes in collaborative and open ways.

The Recent Effects of Banking Regulations on FDIC Insured Banks

Greg Jackson

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The federal government has mandated several banking regulations since the turn of the century. This paper will explore how these regulations have impacted the balance sheets of commercial banking institutions. Total loans and leases accounts of commercial banks are analyzed in order to demonstrate how the federal banking regulations are affecting banks' lending behavior. Commercial banks are placed into four categories based on their asset size. Comparison among these categories is used to address if these regulations affect the banks differently based on their size.

Generational Differences in the Workplace

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Are there generational differences in the way employees perceive responsibilities at work? Do some employees value work-life balance more than other employees? This research examines generational differences in order to determine what differences exist and how these differences are perceived. Empirical research has only begun to look at the most recent generation as they have entered the workplace. The current study looks to expand upon this research by looking at the differences between the four major generational cohorts (Traditionalists ages 67 and above, Baby Boomers ages 49 to 66, Generation X ages 32 to 48, and Millennials ages 31 and below). We have designed a survey to determine how each generation views a variety of workplace issues, as well as how each generation views the other three generations. Some of the issues studied include definitions of work ethic, attitudes towards women, multitasking and the work-life balance that each generational cohort desires. This research study will begin to help organizations find ways to motivate employees from a variety of generations in order to obtain the highest productivity and retention.

Does Technical Analysis Pay-off In Latin America

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My paper attempts to, firstly, identify the presence of asymmetry of stock returns and the profitability of several simple technical trading rules in the emerging markets of Latin America. This paper will analyze the performance of various investing strategies in the countries of Brazil, Argentina, Venezuela, Chile, and Mexico. The main motivation of this research is to apply previous literature to develop a more comprehensive examination of technical analysis in emerging equity markets. According to my literature review, the use of technical analysis in the emerging equities of South America has not been studied. Therefore, this paper will apply two technical indicators (moving averages and Bollinger bands) to the emerging markets of South America. Further investigation is done through the use of previously applied regression models in an attempt to determine the statistical significance of the trading rules. Results from the regression models are compared to the returns generated by the trading rules to examine whether the models chosen are a good indicator of the on goings of the market. I expect my results to present evidence that technical trading rules do consistently generate excess return over the buy-and-hold method of investing. This would suggest that the movements of the market may not be an unpredictable random walk, but rather can be captured by an autoregressive econometric model.

Determinants of Public Universities' Tuition Levels

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This paper uses an ordinary least squares regression analysis to explain the determinants of in-state tuition at public academic institutions and how tuition has been affected by cut-backs in state educational appropriations, among other variables. While utilizing data from 45 public universities representing 45 states, statistical results from 2006 to 2011 indicate that in-state tuition depends upon state appropriation levels, endowment assets, average financial aid received, per-capita personal income, and the region where the educational institution is located. This study is attributed to the notion that annual educational state appropriation levels have decreased while annual in-state tuition has progressively increased for public universities. The data suggests that during this timeframe, there is an average of 8.5% in cut-backs per state allocated towards educational appropriation levels compared with an average increase of 40.2% to in-state tuition. The results show that for every dollar distributed to a state's educational appropriation, an 18 cent reduction to in-state tuition occurs, holding everything else constant. The reductions to state appropriation levels do not justify the ample hikes in tuition; therefore, the results suggest that there is another variable that better determines the excessive increase in public institution's in-state tuition levels during this timeframe.

Skill in Poker: Empirical Evidence from the Statistical Analysis of Low Stakes Play

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The recent legal rulings in regards to online poker have created an inquiry into the relative importance and effect skill has on the game. Despite the impact of the legislation, most rulings have occurred in absence of empirical data. The purpose of this paper is to provide evidence of skill in poker through the statistical components of the game.

HUMANITIES ORAL PRESENTATIONS

Poverty Point: An Archeological and Religious Monument

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Louisiana is home to an amazing potential UNESCO World Heritage site, right in Centenary's backyard. While most of us probably know far too little about

Poverty Point, its significance to American heritage and human development is immense. This paper will discuss an overview of Poverty Point's archeological and religious impact as well as detail parts of the daily culture of the inhabitants of this earthwork.

**“An Aid to the Communist Conspiracy”?
An Investigation of the National Council of Churches
by St. Mark's Episcopal Church, 1959-1967**

Brenton Gryder

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In 1961, the vestry of St. Mark's Episcopal Church began investigating the National Council of Churches (NCCCA) for their alleged connection to the Communist Conspiracy. After eleven months of research, St. Mark's published their findings in a booklet that was distributed across the country. The vestry concluded that “the NCCCA although not communistic, has been an aid to the Communist Conspiracy.” The actions of the vestry represented a clear political calculation to remove St. Mark's from the NCCCA, discredit the organization, and dismiss the progressive policies advocated by the NCCCA. This was achieved by connecting the NCCCA to Communism. The church ultimately tapped into an ethos of fear of Communism in order to stop social change in the turbulent 1960's. After all, anti-Communism was deeply entrenched in the local community. As such, St. Mark's move was a political gambit that could only succeed.

Evangelical Sports Ministry at the Collegiate Level

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The world of sport combined with a conservative, evangelical worldview provides an interesting intersection that is manifested in many arenas, and often at the collegiate level. Sport is highly sex-segregated, and enforces the idea that men and women have distinct capabilities. Furthermore, the evangelical worldview promotes the idea of God working through supernatural acts and the idea that everything has a divine order. These two concepts intersect in sports ministry which often plays out in colleges across the nation. This study investigated the various college's sports programs around the nation that are members of the Council for Christian Colleges and Universities (CCCCU) whose mission is to “faithfully relate scholarship and service to biblical truth.” Specific attention was directed towards campuses which provided sports ministry majors, and the breakdown in coaching staff for their athletic teams.

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